



**Karolinska
Institutet**

**Department of Molecular medicine and Surgery, Section of
Orthopaedics**

ACUTE ACHILLES TENDON RUPTURE

Predictors and Intervention to Promote Outcome

THESIS FOR DOCTORAL DEGREE (Ph.D)

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Erica Domeij Arverud

MD

Principal Supervisor:

Associate prof. Paul Ackermann, MD, PhD
Karolinska Institutet
Department of Molecular Medicine and Surgery
Division of Orthopaedic Surgery

Co-supervisors:

Gunnar Nilsson, MD, PhD
Karolinska Institutet
Department of Molecular Medicine and Surgery
Division of Orthopaedic Surgery

Daniel Bring, MD, PhD
Karolinska Institutet
Department of Molecular Medicine and Surgery
Division of Orthopaedic Surgery

Professor emeritus Per Renström, MD, PhD
Karolinska Institutet
Department of Molecular Medicine and Surgery
Division of Orthopaedic Surgery

Opponent:

Professor Nicola Maffulli, MD, PhD
Queen Mary University of London
Department of Sports and Exercise Medicine
Division of Orthopaedic Surgery

Examination Board:

Associate prof. Lasse Lapidus, MD, PhD
Karolinska Institutet
Department of Clinical Science and Education
Division of Orthopaedic Surgery

Associate prof. Helene Alexanderson, PT, PhD
Karolinska Institutet
Department of Neurobiology, Care Sciences
and Society
Division of Physiotherapy

Katarina Nilsson-Helander, MD, PhD
The Sahlgrenska Academy, University of
Gothenburg
Department of Clinical Sciences
Division of Orthopaedic Surgery

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ABSTRACT

Background: Orthopaedic trauma and surgery is still associated with major complications related to immobilization, which results in reduced circulation, thromboembolic events, impaired healing and functional deficits. An acute Achilles tendon rupture (ATR) is associated with a high risk of deep venous thrombosis (DVT) and varied extent of impaired physical ability. The knowledge of underlying factors leading to hampered functional outcome one year after surgery of ATR is still limited. Since pharmacological DVT-prophylaxis has low or no effect during lower leg immobilization it is speculated whether adjuvant mechanical treatment with intermittent pneumatic compression (IPC) applied during lower limb immobilization can reduce the incidence of DVT.

Aims: The purpose of this thesis was to assess predictors of outcome after acute ATR and to investigate if an intervention using IPC could reduce the risk of immobilization-induced complications, i.e. to reduce DVT-incidence and to enhance the healing response.

Results and Discussion: In a prospective cohort of ATR patients using combined patient reported- and functional outcome measures predictors of outcome were investigated. This thesis established that three independent factors predict patient outcome at one year post-operatively. Thus, it was demonstrated that postoperative DVT during leg immobilization, aging and male gender are independent predictive factors of patient outcome. Moreover, more than half of the patients exhibited significant functional deficits at one year post-operatively. These results imply that specific interventions are warranted to prevent DVT.

In a prospective randomized study, intervention with IPC under plaster cast was compared to treatment-as-usual with plaster cast only. DVT incidence was assessed using compression duplex ultrasound (CDU), by two ultrasonographers blinded to the treatment. The study ended prematurely since an interim analysis demonstrated a high, non-significant incidence of DVT in both groups, IPC (75%) and controls (50%), and a malfunctioning of the IPC device under plaster cast. These findings suggest that other means of applying IPC during immobilization should be evaluated.

The above conclusions resulted in a prospective randomized trial comparing adjuvant IPC applied under an orthosis versus plaster cast only. CDU analysis demonstrated significantly reduced incidence of DVT at 2 weeks post-operatively, 21% in the IPC-group compared to 37% in the control group. Patients aged ≥ 40 years exhibited an almost fivefold increased odds of DVT. Moreover, patients that received no IPC treatment exhibited an almost threefold increased odds for DVT, independently of age. Furthermore, using microdialysis technique, adjuvant IPC treatment was shown to increase the metabolic activity at 2 weeks post-operative ATR. The demonstration that adjuvant IPC effectively reduced DVT incidence, and also is capable of enhancing the metabolic response suggests that IPC treatment may not only be a viable means of prophylaxis against DVT in an outpatient setting, but possibly also a method of promoting healing.

Conclusions: This thesis established that poor outcome is common after ATR and that three specific, independent risk factors can predict a negative outcome after ATR. One of these risk factors, i.e. DVT, can be prevented by IPC used under an orthosis during lower limb immobilization. The results suggest that all patients with lower leg immobilization should be screened for risk factors of DVT and that IPC may be an effective, non-pharmacological outpatient approach to reduce the risk of DVT, maybe also for enhancement of healing.

Keywords: Achilles tendon rupture, Epidemiologic factors, DVT, Intermittent pneumatic compression, Outcome assessment, Functional evaluation, Tendon healing, Microdialysis